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EXPERIMENT STATION  
TUSKEGEE NORMAL & INDUSTRIAL INSTITUTE  
TUSKEGEE INSTITUTE, ALABAMA

A Study of the Soils of Macon  
County, Alabama, and Their  
Adaptability to Certain  
Crops



Bulletin No. 25, 1913

By George W. Carver, M. S. Agr.



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INSTITUTE PRESS  
TUSKEGEE INSTITUTE, ALABAMA  
1913

## The Tuskegee Experiment Station

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## A Study of the Soils of Macon County, Alabama and their Adaptability to Certain Crops

By G. W. Carver, M. S. Agr., Director

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### LOCATION AND BOUNDARIES

Macon County, "the garden-spot of Alabama," lies near the eastern boundary of the State, about 135 miles north of the Florida-Alabama line. It has an area of 621 square miles, embodying 397,440 acres. It is 34 miles in extent from east to west, and  $24\frac{3}{4}$  miles from north to south. The northern and western boundary lines are quite irregular.

### COUNTY SEAT

Tuskegee, the county-seat, was laid out in 1833, and has grown steadily since the removal of the Indians in 1836. It is located in the north central part of the county, and is noted for its commanding location, beautiful surroundings, and the purity of its waters. Indeed, mineral water of no mean composition has been found here and there within its borders.

### HISTORY

Macon County was named in honor of the illustrious North Carolina statesman, Nathaniel Macon, and was established as a county December 18, 1832, by act of the General Assembly of the State of Alabama.

### CLIMATE

In this we have a condition that is well-nigh ideal, situated as we are in the Gulf--Costal plain. We have mild winters and hot summers, or the most favorable conditions for agricultural pursuits. The average growing season is about 251 days, wholly free from frost.

The following table, which covers a period of 13 years, gives the maximum (the highest) and minimum (the lowest) temperatures, together with the total rainfall, for each month, with the grand total for the year, bringing out the following interesting facts regarding the climate:

1. The mildness of our winters. (At no time during the 13 years has the thermometer fallen to the zero mark.)

2. There are about three instances only when the thermometer has risen higher than the 104-degree mark and at such times the whole country was suffering from a depressing heat wave. I have never heard of a prostration from heat within the county.

3. The rainfall has been remarkably constant in quantity, and

widely enough distributed throughout the month to make agricultural activities a success even in the hands of the intelligent amateur.

A study of the meteorological table, I feel sure, will prove interesting, as the data was taken right here at Tuskegee.

Situated as we are, crops often suffer for water, especially where scientific methods are not applied; but where the ground has been prepared good and deep, fertilized well with manure containing plenty of vegetable matter, and the crop followed by frequent and shallow cultivations, the crop can be tided over with little injury to it during the ordinary drouth period.

### SOILS

The soils of the county are exceedingly variable, and nearly every soil specialist has his own system of classification; but in the end they mean practically the same thing. I have, however, adopted the following as coming from the best authorities on this subject:

#### MULATTO, OR ORANGEBURG SANDY LOAM

This type of soil constitutes the major portion in and about Tuskegee, including the soils of Tuskegee Institute, with outcroppings of coarse sand, gravel, and numerous iron concretions. In some places indeed it blends into Norfolk coarse sand, especially in the vicinity of Tuskegee Institute and westward. I found the largest area to begin just south of the town of Tuskegee and continue to the western border of the county. Twenty-seven and five-tenths per cent of the total area, or 110,144 acres, are of the above type.

### SUBSOIL

The subsoil is quite variable, ranging from the intense oxide reds to yellow, purple, mottled, brown, etc. Quartz and gneiss stones abound in some places, and rather extensive ochre beds are not infrequent.

### AGRICULTURAL POSSIBILITIES

Where the land is rolling (and most of it is) it washes badly, and constant care must be exercised to keep it from literally sloughing away and leaving great ditches, gutters, and bald places at the end of almost every hard rain. The prevention of this is best effected by the following methods:

(a) Properly constructed terraces to distribute the excess of water and cause it to spread over the ground in sheets rather than all rush to one or a few places which means more or less destructive washing.

(b) Put plenty of vegetable matter into the soil, such as leaves, straw, muck from the swamp, barnyard manure, in fact, all manure from the farmyard.

This causes the land to hold more water by absorbing it like a sponge. It also holds the soil particles together and takes up and holds the plant food put into the soil in the form of fertilizers, manures, etc. It further permits the air to circulate more freely through

JANU  
FEBE  
MAR  
APRI  
MAY  
JUNE  
JULY  
AUG  
SEPT  
OCT  
NOV  
DECI



# TABLE

	1900			1901			1902			1903			1904			1905			1906			1907			1908			1909			1910			1911			1912			
	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall	Maxi- mum	Mini- mum	Precip Rain- fall				
JANUARY	78	11	1.77	71	27	5.45	71	19	2.41	73	23	2.36	66	20	5.50	72	12	4.18	76	26	5.84	81	24	1.31	69	20	3.18	87	15	1.6	74	20	3.17	78	12	3.73	76	15	8.31	Killing frosts
FEBRUARY	75	11	10.02	71	16	3.00	68	22	6.36	78	18	9.42	82	28	5.75	68	8	7.27	73	26	1.91	75	27	3.44	74	20	2.91	77	18	7.38	80	20	7.40	81	26	2.91	75	17	5.19	may be
MARCH	78	27	4.20	77	19	5.14	80	28	9.92	82	41	5.60	86	31	2.75	82	38	1.95	76	26	6.92	92	43	2.33	90	35	5.46	79	33	12.85	89	32	.52	89	32	2.42	93	29	11.56	looked for
APRIL	88	10	5.94	85	36	3.74	88	37	1.33	84	37	3.89	86	32	1.13	87	35	3.91	93	37	1.27	86	35	6.27	90	39	7.95	90	37	4.14	89	32	1.15	86	45	5.53	85	35	13.42	as follows:
MAY	92	51	1.32	93	51	4.87	97	55	2.67	92	50	3.97	96	50	4.70	97	55	1.67	95	50	3.34	88	50	5.20	96	41	2.22	89	42	5.57	92	48	2.41	100	49	.09	96	47	1.85	Spring—as late
JUNE	95	63	6.05	99	61	3.28	101	76	.57	94	51	4.95	98	61	1.37	97	62	2.30	99	61	3.01	96	55	.45	99	61	1.17	97	65	6.09	98	54	7.32	103	65	1.80	100	58	3.35	as March 11th
JULY	98	64	5.26	104	64	2.37	103	67	2.11	100	65	3.88	99	62	3.03	97	68	7.58	98	65	8.53	101	68	5.88	101	69	2.22	88	64	4.60	98	60	3.14	100	58	2.85	99	66	0.23	Fall—as early
AUGUST	104	66	4.72	97	66	6.70	104	66	2.38	100	68	1.39	95	61	2.03	97	60	1.91	98	60	4.05	101	65	1.00	101	62	6.28	101	67	2.93	101	66	1.39	100	64	5.62	98	64	8.03	as Nov. 16th.
SEPTEMBER	100	61	46	95	52	2.09	97	55	3.54	99	51	2.52	102	60	.78	102	60	0.00	97	66	5.51	101	50	1.96	98	50	20	94	47	1.42	97	51	2.86	100	63	2.86	101	60	5.94	
OCTOBER	92	10	2.65	87	40	1.29	90	38	3.64	95	32	1.79	97	38	.12	90	40	3.07	84	33	3.20	92	36	.88	96	40	2.77	97	34	1.23	96	30	2.11	99	35	2.50	97	51	2.05	
NOVEMBER	81	31	5.01	84	25	1.42	84	28	4.51	81	21	0.66	78	31	2.20	85	39	2.43	82	33	2.63	80	31	8.67	83	32	.67	86	33	2.16	79	32	2.32	79	22	3.36	80	22	2.31	
DECEMBER	65	5	5.75	76	11	11.46	73	16	6.51	65	19	2.29	75	22	4.57	66	27	11.38	78	19	3.94	71	24	7.83	78	29	2.06	76	14	5.89	71	21	2.75	78	22	6.21	79	25	6.54	
Totals	53.16			50.79			44.95			42.72			33.93			46.65			50.15			45.22			37.09			45.86			36.54			43.88			74.81			



the soil, encouraging the growth of soil bacteria, without which a successful crop could not be produced.

(c) Deep plowing, to let the water into the soil; to turn up to the surface and within reach of the plant much fertility that has sunken below the depth to which the roots of our ordinary farm plants penetrate. It also is a great insect destroyer—by turning under the eggs of hybernating (resting) insects deposited in the stems of weeds, under leaves, stones, trash, etc., of various kinds, deep down into the soil, where they perish. Likewise it turns to the surface many insects that hide away in the ground. This reverses Nature's process, and they, too, perish likewise.

### PREPARATION OF THE SOIL

It is especially essential that this soil be properly prepared. In nearly all Southern soils we must recognize, as a rule both physical and chemical deficiency, the former being of quite as much, and often of greater, importance than the latter.

All plowing should be ultimately from 8 to 12 inches; and since any extreme is more or less dangerous, this depth should be reached gradually unless we have plenty of barnyard manure or its equivalent in vegetable matter, supplemented by the proper commercial fertilizers. Where land has been plowed real shallow, say 3 or 4 inches, it will pay to broadcast a liberal coating of leaves, straw, muck, and barnyard manure upon it. Plow this under four inches; run over it several times with a disc harrow; spread another application of manure on, the same as the first; plow under four inches deeper, making eight inches in all; harrow in the same way; put the commercial fertilizer in the drill as usual. If this has been thoroughly done a good crop may be expected. The soil can be deepened to advantage a little more next year. In using commercial mixtures aim at the following:

2 per cent nitrogen,  
2.3 per cent ammonia,  
8.0 per cent available phosphoric acid, and  
2.3 per cent potash,

approximately requiring from—

80 to 120 lbs. cotton seed meal per acre,  
40 to 60 lbs kainit per acre,  
160 to 240 lbs acid phosphate per acre.

It is a good plan to feed the plants as they need it—by dividing the commercial mixture into two parts, putting half down at the time of planting, and the other when the crop is about half grown. This is easily and quickly done with a fertilizer distributor.

The farmer must never lose sight of the fact that nothing will build up the soil as quickly and permanently as barnyard manure; so therefore arrange to save just as much as possible. It is further important that the rows for planting are not run directly up and

down hillsides but so the furrows will catch and hold the water from a medium shower and check that of a heavier one.

### CROP ADAPTATIONS

These soils are rather quick and responsive, and for the most part give up their water readily; and as rule the planting should be flat and the cultivation frequent and shallow (not more than two inches.)

The following crops seem to be especially adapted to this type of land. In arrangement I have placed them in accordance with their special adaptation to the soil the first named being those crops that most readily adjust themselves to the above type of soil:

**FIELD CROPS.**—Cow peas, sweet potatoes, corn, cotton, sorghum, German millet, peanuts, oats, barley, rye, wheat (not a sure crop), crimson clover, velvet beans, Lyon beans, hairy vetch, smooth vetch, white clover, yellow hop clover, Japan clover, cat-tail millet, teosinte, burr clover, alfalfa (an encouraging possibility), also brown corn and sweet clover.

**GARDEN CROPS.**—Onions, watermelons, cantaloupes, okra, squash, beets, lettuce, radishes, beans, English peas, turnips, rutabagas, kale, rape, cabbage, mustard, petsai, Swiss chard, endive, artichokes, cucumbers, white potatoes, cauliflower, peppers, asparagus, parsley, kohlrabi, leeks.

**FRUIT CROPS.**—Peaches—Early varieties: Mayflower, Sneed, Greensboro. Following these are: Carman, Camelia, Mamie Ross, Belle of Georgia, Chinese, Burke, Stonewall Jackson, Elberta, Matthew's Beauty, Lyndon Cling, Salway, and Stinson's.

**APPLES.**—In this section I found no apples that seemed at all promising except the Red June, Early Harvest, and Grim's Golden in the heavier soils.

**PEARS.**—Pears do well on these soils, except that some varieties blight seriously, both the blossoms and the twigs. Those that I found freest from blight were the Keiffer, Garber, Magnalia, Bartlet, Koonce, and Early Harvest.

The Duchess and LeConte are fine large pears, but they blight so seriously in this section that it makes the crop too uncertain; therefore they should not be planted.

**PLUMS.**—Of the Japan group I found the following varieties in excellent condition and all that could be desired: Red June, Abundance, Shire, Burbank, Chabot, and Wickson.

Of the Green Gague (Wild Goose) or Chicasa types, the varieties were so numerous, and the wild and cultivated sorts so intimately and almost inseparably blended into each other, that I have not attempted to classify them. It is sufficient to say that all do well.

**GRAPES.**—The following varieties of grapes were noted: Concord, Delaware, Scuppernong, Roger Hybrids (Heavy Fruiters),

Moore's Early (good but shy in bearing), Niagara (very fine but a little uncertain as to crop), Amber, Brighton, and Ives are essentially the same as Niagara in bearing.

**FIGS.**—This splendid fruit deserves more extensive planting. I found these varieties doing exceedingly well: Brown Turkey, Brunswick, Celestial, Madeline, Magnolia, Green Ischia, and Black Ischia.

**STRAWBERRIES** do well on these soils, but considerable care must be taken or they will die out during the summer from excessive heat and drouth. I found many varieties doing well, but the following seemed to be the cream of the lot: Heflin's Early, Klondike, Brandywine, Warfield, Haverland, Hoffman, and improved Lady Thompson.

**BLACKBERRIES.**—I found no cultivated sorts growing within the county, but the wild vines are luxuriant, heavy fruiters, and abound throughout the county; and I see no reason why the standard sorts should not thrive.

**MULBERRIES.**—Hicks, Downing, and White and Black English make splendid trees, heavily laden with fruit.

**POMEGRANATES.**—The Spanish Ruby, Subacid, and Sweet seem especially adapted to these soils.

**NUTS.**—Pecans, black walnuts, English walnuts, hickorynuts, and chestnuts seem to do exceptionally well. The chestnuts, however, seem a little shy in bearing.

### ORANGEBURG CLAY

The largest area of this clay lies between Calabee and Cubahatchie Creeks, extending from La Place to Cotton Valley.

This same type of soil extends along Big Swamp Creek, directly east and north, running westward to Little Calabee Creek.

There are a number of smaller areas scattered over the southern half of the county. Some of these soils are underlaid with a sort of limestone, inclined to be marly in some places. Very often this soil is termed "hog-wallow," but it is not the hog-wallow proper. Seventeen and five-tenths per cent of the total area, or 69,504 acres, are of the above type.

### PREPARATION

This soil requires the greatest care in its preparation if the best results are to be obtained. It is especially important that the plowing be done deep and thorough. The portion designated as "hog-wallow" and "sandy clay" washes and gullies badly during heavy rains. In fact, the soil is quicky, and melts down almost like a sugar-loaf when wet.

When handled properly this soil yields remarkably well, but must not be plowed or cultivated when it is too wet. It also must be caught when the moisture conditions are just right, or neither breaking nor

tilling can be satisfactorily done. This is why so much of the land of this character has been abandoned.

It is especially important that plenty of vegetable matter be worked into this soil.

During long periods of dry weather the crop should be cultivated at least once every nine days, and just as soon after a shower of rain as you can get into it. Do not cultivate deeper than two inches. Fertilize exactly the same as for the preceding soil.

### CROP ADAPTATIONS

All the crops mentioned for Orangeburg Sandy Loam will thrive in this; and it seems especially adapted to the growing of corn, cotton, sweet potatoes, cow peas, and peanuts.

I found very promising patches of alfalfa in the lime sections. Sorghum cane and broom corn do well where properly fertilized and cultivated.

### NORFOLK COARSE SAND

constitutes 10.8 per cent of the total area, or 42,752 acres. The type of soil may be found from about a mile east of Tuskegee to five miles west of Society Hill, and in irregular bands along the upland to the south of Uphapee Creek. Its next occurrence is in a large body between Chowocla and Chewockeleehatchee creeks, extending to Pleasant Hill, Alliance, and Little Texas. This soil is very treacherous for crops. The season must be unusually favorable or the crops are more or less of a failure. This is due largely to the fact that the soil is very porous, which causes it to give up its water readily, and therefore is nearly always in a drouth-stricken condition.

### CROP ADAPTATIONS

At present practically no crop is much of a success, sweet potatoes being the best. Even fruit trees, such as peaches, cherries, etc., give fair yields, but are short-lived.

### NEEDS

The first thing this soil needs is plenty of vegetable matter, such as muck, leaves, straw, barnyard manure, green crops, etc., worked into it year after year until the whole sandy condition is changed to an alluvial soil. Then any of the crops designated for Orangeburg Sandy loam will not only thrive, but many will give superior yields in both quality and quantity. Peaches, pears, grapes, Chinese quinces, etc., will do exceptionally well. This is readily brought out by the farmer who has had foresight enough to take the above precautions. It is easy to see that his soil is becoming less drouthy and hence more productive every year.

### ADDITIONAL FERTILIZATION

In addition to the prime essential vegetable matter, aim at the following:

- 1.9 per cent nitrogen,
- 2.3 per cent ammonia,
- 8.0 per cent available phosphoric acid, and
- 2.3 per cent potash,

which approximately can be had from the following mixture:

- From 80 to 120 lbs. cotton seed meal per acre,
- From 40 to 60 lbs. Kainit per acre,
- From 160 to 240 lbs. acid phosphate per acre.

The feeding method should be practiced on these soils, or much of the fertilizer will be lost.

It is well to remember that, on this soil, large amounts of commercial fertilizers are more detrimental to the crop than beneficial, as it causes it to fire more readily, owing to a lack of vegetable matter in the soil and sufficient moisture.

### NORFOLK GRAVELLY LOAM

This type of soil constitutes quite 14.3 per cent of the total area, or 56,900 acres. Its location approximately begins west and north, and including some of the Tuskegee Institute possessions, east beyond the Uphapee Creek to the county line beyond Notasulga, and within four miles east of Milstead. It blends almost inseparably into the Orangeburg Sandy Loam and Norfolk Coarse Sand, and on account of its being more open in texture, it is consequently more droughty and therefore less productive.

### TREATMENT

Treat exactly the same as for Norfolk Coarse Sand, taking special care to work into the soil plenty of vegetable matter, with a view to overcoming its droughty and scalding propensities.

I think I have never seen soil respond more readily and more satisfactorily to such treatment than this. It produces a superior quality of sweet potatoes, as well as a satisfactory quantity (400 bushels have been produced on an acre). The sugar cane makes a very bright, pretty syrup; the best peaches are raised on these soils; pears and Chinese quinces (*Quinceadonia*) do well and yield abundantly up about Notasulga. I also found some very fine apples growing in this section. This soil, when built up, responds admirably to all kinds of truck crops.

### LUFKIN CLAY

makes up 8.1 per cent of the total area, or 32,00 acres. This area constitutes the heavy red or yellowish red clay loam, which becomes so extremely sticky and gummy when wet.

The largest areas lie about 1 1-2 mile east of Chesson, and two miles east of Hardaway. This soil is naturally very productive, but unfortunately but few farmers know how to handle it. To the majority it is too wet or too dry, too hard or too soft to work; hence, it lies idle as a rule. Underdraining is the ideal thing needed, but some farmers are making excellent crops by working vegetable matter into it in the shape of leaves, straw, sawdust, muck, barnyard manure, etc.

I have in mind now a farmer who had about an acre of such soil on his farm. It had been originally used as a brickyard—it was even then full of brick-bats. Nothing grew upon it—not even weeds or grass, but after heavy rains water stood there for days upon it.

#### TREATMENT

He proceeded as follows, taking the land when it was comparatively dry:

1. Just as much leaves and tops from stripping the sugar-cane for planting as could be turned under with a good plow and two heavy mules, was put under to a depth of 8 or 9 inches.

2. It was disked well—crosswise, lengthwise, etc.

3. A heavy layer (from 5 to 6 inches) of leaves, muck, etc., from the swamp was spread over it and plowed in with a one-horse plow just deep enough so that it did not pull up the first layer.

4. It was disked again.

5. A layer of barnyard manure was applied now, the same as the leaves, muck, etc., and plowed in lightly so as not to interfere with the leaves, etc.

6. Disked again.

7. It was laid off, the commercial fertilizer put in, planted in cotton, and cultivated the same as the other part of the field. This area was noticeably better than any other part of the field in growth and yield of cotton.

The next year it changed hands and went back into those belonging to the old land-robber school, that of taking everything out and returning nothing. He has had it four years, and now this spot is the most productive of any in the field.

I can further testify to its value as portions of the Experiment Station have been built up in exactly the same way.

#### NORFOLK SAND

This area constitutes 5.5 per cent of the total, or 22,016 acres. It is found one-half mile west of Warrior Stand, and two miles north of Calabee Creek. This type of soil is poor, washes badly, and should be handled exactly the same as recommended for Orangeburg Sandy Loam.

#### NORFOLK FINE SANDY LOAM

constitutes about 5.5 per cent of the total area, or 21,952 acres. It is found six miles south of Tuskegee, and three miles south of La

Place—the principal areas lie along the upper courses of Calabee, Gubahatchee, Line, and Old Town creeks. The soil is rich and productive, but subject to overflow, which is its worst drawback.

Prepare, fertilize, and cultivate the same as for Orangeburg Sandy Loam—the yield, however, will be much better. Sugar-cane, broom corn, sorghum cane, pears, apples, and oats seem to do exceptionally well.

#### NORFOLK SANDY LOAM

occupies 2.4 per cent of the total area, or 9,408 acres. It is found near Tuskegee, and extends three miles east of Chehaw. In crop adaptation, fertilization, preparation, yield, etc., it is essentially the same as Orangeburg Sandy Loam.

#### HOUSTON BLACK CLAY

constitutes 2.2 per cent of the total area, or 8,576 acres. This small area is found one-half mile south of Edwards, and is known as "black prairie land." It is very level and is inclined to be wet. Naturally the soil is very fertile, and the staple crops do well except in times of excessive rainfall.

Native grasses do well, especially Johnson grass, and, with proper draining, I am sure alfalfa would thrive. This section is especially adapted to stock-raising.

Deep plowing, proper draining, and moderate fertilization is all that is needed for the production of excellent crops.

#### OCKLOCKNEE CLAY

constitutes 1.2 per cent of the total area, or 4,800 acres. It occupies a small area 2 1-2 mile west of Milstead. This is probably the richest soil of the county, and in favorable seasons produces a bale of cotton and 40 bushels of corn (with the small application of 200 lbs. of mixed commercial fertilizer) per acre. It brings excellent truck, squash, cushaws, pumpkins, etc., in abundance. It is fine for sugar-cane, sorghum, and hay crops.

#### MEADOW

constitutes 4.9 per cent of the total area, or 19,328 acres. The so-called "meadow-lands" consist of nearly flat areas along streams, and is typical overflow land; so much so that rarely any attempt is made to cultivate it. Nearly all supports a dense growth of water-loving trees. It yields excellent crops when cleared, drained, and properly tilled, which, in essentials, does not differ from the Ocklocknee Clay.









